WHAT DRIVES CHILD HEALTH INEQUALITY IN NIGERIA? DECOMPOSING THE SOCIOECONOMIC GAP IN CHILDREN NUTRITIONAL STATUS

Rabi'u Isah Mohammed
PhD. Candidate,
Department of Economics,
Federal Uiversity of Lafia,
Nasarawa State, Nigeria.
rabiu.isah@fulokoja.edu.ng

Ilemona Adofu
Department of Economics,
Federal University of Lafia,
Nasarawa State, Nigeria.
ilemona1975@gmail.com

Salami Abdulganiyu
Department of Economics,
Federal University of Lafia,
Nasarawa State, Nigeria.
salamiabdulganiyu@gmail.com

ABSTRACT

Child undernutrition remains a critical public health challenge in Nigeria and despite policy efforts, evidence on the magnitude and drivers of inequality in child nutritional status using formal decomposition methods remains limited. This study quantifies and decomposes socioeconomic inequality in child nutritional status in Nigeria using three waves of the Nigeria Demographic and Health Survey (2008, 2013 and 2018). Socioeconomic inequality in weight-for-age z-scores (WAZ) was measured using the Concentration Index (CI) while Wagstaff and Oaxaca-Blinder decomposition methods were employed to quantify the contribution of each determinant to overall inequality. The result shows a persistent pro-poor inequality in child nutrition observed across all survey years. When ranked by wealth, the CI was -0.202 (2008), -0.150 (2013) and -0.171 (2018); when ranked by maternal education, the CI was -0.220, -0.167 and -0.188, respectively (all $p<0.01$). Decomposition analyses revealed that maternal secondary and tertiary education were the largest contributors to wealth-based inequality, while household wealth was the dominant driver of education-based inequality. Antenatal care visits contributed a mild 13–26% across models. On the side of Oaxaca–Blinder decomposition, the result showed that the mean WAZ gap between rich and poor children ranged from -0.635 to -0.778, with the explained component rising from 47.5% in 2008 to 60.0% in 2018, driven primarily by maternal education and antenatal care visits. The unexplained component increased markedly by 2018 (23.8%), suggesting growing disparities in the returns to endowments. The study concludes that socioeconomic inequality in child nutrition in Nigeria is persistent and structurally entrenched. Therefore, the study recommends, among others, that government should ensure girls complete secondary education through targeted scholarships and conditional transfers as well as ensure instituting and scaling up of nutrition-sensitive cash transfers for the poorest households.

Keywords: *Child undernutrition, weight-for-age z-scores, health inequality, Concentration Index, decomposition, socioeconomic determinants, NDHS*

***Corresponding Author:**
Rabi'u Isah Mohammed
PhD. Candidate,
Department of Economics,
Federal Uiversity of Lafia,
Nasarawa State, Nigeria.
rabiu.isah@fulokoja.edu.ng

1. Introduction

Child undernutrition is one of the most serious public health issues in especially low- and middle-income countries (LMICs). Malnutrition has serious implication for survival, human capital formation and potential economic growth. Malnourished children face risks of morbidity and mortality. And sometimes they also face the risks of impaired cognitive development, low educational attainment and therefore would potentially have lower productivity in adulthood than their well-nourished counterpart. This potential low productivity breeds intergenerational cycles of poverty and inequality (Black et al., 2013; Victora et al., 2022). As such, understanding and improving child nutritional status is central to the development of any serious nation.

Socioeconomic determinants of health (herein wealth, education and occupation) create gradients in health outcomes by shaping access to resources, health-related knowledge and living conditions (Solar & Irwin, 2010). In general, there is an uneven socioeconomic status stratification such that attempted progress towards addressing child malnutrition remains highly unattainable. Evidence abound in the literature consistently shows that undernutrition is disproportionately concentrated among children from poorer households, or those in rural areas, or those that are of less educated mothers (Wagstaff et al., 2014). Unfortunately, this unevenness cannot simply be passed as just biological but they are, in fact, rooted in structural inequalities in income, education, gender relations, access to health and nutrition services, etc. From a health economics perspective, such unequal distribution of child health based on certain socioeconomic characteristics points to both differential endowments (resources and characteristics) and differential returns to those endowments across the social groups (O'Donnell et al., 2008; Diderichsen, Hallqvist & Whitehead, 2019). Nigeria is a case in point of these challenges. For, despite being the Africa's largest economy and experiencing episodes of economic growth over time, Nigeria continues to report high levels of child malnutrition alongside clear socioeconomic and regional inequalities (National Population Commission [NPC] & ICF, 2019). National averages reveal wide gaps between wealth quintiles, maternal education levels and urban–rural locations. For example, the 2018 reports of Nigeria Demographic Health Survey (NDHS) show that 37% of children under five were stunted, 22% underweight and 7% wasted (NPC & ICF, 2019). These patterns may be pointer to the fact that economic growth alone has not been sufficiently generating inclusive improvements in child nutritional outcomes.

This study investigates socioeconomic inequality in child nutritional status in Nigeria using weight-for-age z-scores (WAZ) from three waves of the Nigeria Demographic and Health Survey (2008, 2013, and 2018). WAZ is a composite indicator of undernutrition, capturing both chronic and acute deficits in child growth (WHO, 2006; Victora et al., 2021). Using a combination of CI with Wagstaff and Oaxaca–Blinder decomposition methods, the paper tries to provide an all-encompassing assessment of both the extent and the sources of inequality in child nutritional outcomes over time. In essence, this study addresses three questions: (i) Is child undernutrition disproportionately concentrated among poorer and socially disadvantaged groups in Nigeria? (ii) How large and persistent are these inequalities between 2008 and 2018? (iii) Which socioeconomic factors account for the observed gaps in WAZ between rich and poor children?

Tackling these questions, the paper contributes to the health economics and development literature in three ways; Firstly, it provides comparable evidence on the distribution of child nutritional status in Nigeria over a decade using standardized NDHS data. Secondly, it moves beyond descriptive analysis by decomposing inequality into interpretable components linked to policy-relevant determinants. Thirdly, it provides insights into whether observed disparities are driven more by unequal access to resources or by unequal returns to those resources. This study therefore speaks directly to current debates on inclusive growth, human capital development and the role of social policy in reducing health inequalities in Nigeria.

2. Literature Review

Socioeconomic determinants of child nutritional outcomes in low- and middle-income countries have recently attracted more and more research, with a greater focus on how income, maternal education and healthcare access disparities contribute to unequal health outcomes. The studies reviewed in this section provide some evidence on the magnitudes and drivers of child health inequalities in different context.

Okutse and Athiany (2025) analysed the socioeconomic inequalities in child malnutrition in Kenya based on the 2014 and 2022 KDHS data. Using logistic regression, they discovered that the rate of inequality in stunting, underweight and wasting rose with time for the children in the poorest households. The greatest source of inequality was the household socioeconomic status, then child age and sex. The research findings indicated that economic growth has failed to bring about fair nutritional results.

Shewarega et al. (2025) studied the socioeconomic inequality in undernutrition among adolescent girls in Sub-Saharan Africa. The analysis of DHS data and concentration indices and decomposition techniques revealed that there were important pro-poor inequalities in undernutrition. Nevertheless, the adolescence aspect of the study, instead of the young children, could restrict the direct comparability to the child nutrition studies.

Anteneh et al. (2025) examined infant mortality in 14 Sub-Saharan African nations in terms of socioeconomic and educational disparities. The research with the help of concentration indices and Wagstaff decomposition methods identified that pro-poor inequality in infant mortality remained constant due to household wealth and maternal education. The findings also revealed the influence of the healthcare access in mediation of these inequalities. A limitation of the study is that country-specific variations and policy contexts might be obscured by the pooled analysis.

In another study Khan and Mohanty (2024) analysed poverty-induced inequality in child nutrition in India using data from the National Family Health Survey (NFHS-4 and NFHS-5), comprising over 300,000 children. The findings revealed that poverty is the leading cause of child undernutrition with considerable differences among the subgroups of the population. It was also found, in the study, that despite general improvement in national nutrition indicators, inequality remained.

The study by Victoria et al. (2021) re-examined the global trends in maternal and child undernutrition based on the results of various low- and middle-income countries. The research used the descriptive and comparative analysis to determine the change in nutritional outcomes and inequalities over time. The results indicated that despite the general decrease in the levels of undernutrition, there are still high socioeconomic inequalities, especially between groups of wealth and education. Nevertheless, its descriptive character highly limits the study.

Using large-scale survey data, Li et al (2020) investigated the role of socioeconomic factors in child malnutrition in a number of low- and middle-income nations. The authors used multilevel modelling and decomposition analysis to evaluate individual- and community-level factors. Findings indicated that the highest proportion of inequality was explained by wealth and maternal education and other aspects at the community level, including infrastructure and access to healthcare, also had major impacts.

While a large body of literature documents the prevalence and correlates of child malnutrition in Nigeria and other countries (e.g Fotso, 2006; Smith & Haddad, 2015; Adebayo et al., 2019), just few of such studies have explicitly examined the distribution of child nutritional status across socioeconomic groups using formal inequality metrics. For, it is not enough to just know that poor nutrition is concentrated on the poor children but there is need for the policy makers to understand the degree that concentration as well as the drivers behind it. Again, existing research on health inequalities in Nigeria has predominantly focused on access to maternal and child healthcare services (Nwosu & Ataguba, 2019; Adeyanju, Tubeuf, & Ensor, 2017). Even though this focus is vital, but it overlook the fundamental socioeconomic determinants of the burden of ill health itself.

3. Data and Methods

3.1 Data Sources

This study uses nationally representative data from three waves of the Nigeria Demographic and Health Surveys (NDHS) conducted in 2008, 2013 and 2018. The NDHS is part of the global DHS Programme funded by USAID and implemented in Nigeria by the National Population Commission (NPC) in collaboration with ICF International. The surveys collect detailed information on population, health, nutrition, and socioeconomic conditions using standardized questionnaires and sampling procedures, which allow for comparability over time and across countries (NPC & ICF, 2019). The NDHS employs a two-stage stratified cluster sampling design. In the first stage, enumeration areas (EAs) are selected from the national census frame; in the second stage, households are systematically sampled within each EA. All women aged 15–49 in selected households are eligible for interview, and anthropometric measurements are taken for children under five. This study pools data from the 2008, 2013, and 2018 surveys to analyse trends in child nutritional inequality over a ten-year period. The analysis is restricted to children aged 0–59 months with valid weight and age information. Sampling weights provided by DHS are applied in all analyses to ensure national representativeness and to account for the complex survey design.

3.2 Measurement of Child Health Status

This study uses weight-for-age z-scores (WAZ) to measure children health. WAZ measure child nutritional status and it is a standard anthropometric indicator recommended by the World Health Organization (WHO, 2006). It compares a child's weight to the median weight of a reference population of the same age and sex, expressed in standard deviations. A WAZ score of 0 indicates the child is at the reference median; negative values indicate underweight, and values below –2 indicate moderate or severe undernutrition.

WAZ is a composite indicator capturing both acute and chronic undernutrition and it is widely used in population-level studies of child health (e.g Victora et al., 2022). In this study, WAZ is treated as a continuous health variable, consistent with the requirements of the CI and decomposition techniques.

3.3 Socioeconomic and Control Variables

In this study, socioeconomic status is captured using three key indicators derived from the NDHS: The first is the household wealth index, which is a composite measure based on assets, housing quality and access to sanitation, used to rank households into quintiles (poorest, poorer, middle, richer and richest). It is one of the key variables serving as the primary ranking variable in inequality analysis (Crear-Perry, et al, 2021). The second variable is maternal education, which is also a categorical variable. For the purpose of this study, this variable is recategorized into: no education, primary, secondary, or higher. Education is believed to influences child nutrition through health knowledge and care practices. The third variable is maternal occupation. This is also recoded into three categories; professional/skilled, sales/services, and manual/unskilled work. This variable measures both income potential and childcare-related time constraints. Additional covariates included in the decomposition models include child's age and sex, mother's age, place of residence (urban/rural), and the number of antenatal care (ANC) visits. These variables are well-established determinants of child nutritional outcomes in the literature (Smith & Haddad, 2015).

3.4 Concentration Index (CI)

Socioeconomic inequality in child nutritional status is quantified using the CI, which measures the degree to which a health variable is distributed across individuals ranked by socioeconomic status. As adopted from Wagstaff and van Doorslaer, (1991) and O'Donnell et al., (2008), CI is defined as:

$$CI = \frac{2}{\mu} \cdot Cov(y_i, R_i) \quad (1)$$

where y_i is the WAZ score for child i, μ is the mean of WAZ while R_i is the fractional rank of the child in the wealth distribution. The values of the CI ranges between –1 and +1. A negative value indicates that WAZ is concentrated among children of the poor household (pro-poor inequality), while a positive value indicates concentration among children from richer household (pro-rich inequality).

3.5 Decomposition of the CI

To identify the sources of inequality, the CI is decomposed using Wagstaff's decomposition method (Wagstaff et al., 2001). First, WAZ is modelled as a linear function of its determinants:

$$WAZ_i = \alpha + \sum_k \beta_k x_{ki} + \varepsilon_i \quad (2)$$

The CI of WAZ can then be expressed as:

$$CI = \sum_k \left(\frac{\beta_k \bar{x}_k}{\mu}\right) CI_k + \frac{GC_\varepsilon}{\mu} \quad (3)$$

where $\bar{x}_k$ is the mean of determinant x_k, CI_k is its concentration index, and GC_ε is the generalized CI of the residual. The term $\frac{\beta_k \bar{x}_k}{\mu} CI_k$ represents the contribution of determinant k to overall inequality. This approach allows inequality in WAZ to be decomposed into contributions from maternal education, wealth, occupation, ANC visits, residence and other covariates.

3.6 Oaxaca–Blinder Decomposition

To complement the CI analysis, the study applies the Oaxaca–Blinder decomposition to examine differences in WAZ between rich and poor children. This technique decomposes the mean difference in a health outcome between two groups. Therefore, a binary wealth indicator is constructed, where rich = 1 for children from richer/richest households and rich = 0 for children from poorer/poorest households. To ensure a sharp contrast, the middle category is excluded in the analysis. The analysis produced two components; explained component, due to differences in observable characteristics (e.g., education, wealth, residence), and an unexplained component; a difference arising from differences in coefficients (returns to characteristics) and unobserved factors.

Formally:

$$\bar{Y}_R - \bar{Y}_P = (\bar{X}_R - \bar{X}_P)\beta_P + \bar{X}_R(\beta_R - \beta_P) \quad (4)$$

Where R and P denote rich and poor groups, respectively (Oaxaca, 1973; Blinder, 1973). This decomposition helps distinguish whether inequality arises mainly from unequal distributions of education, wealth and healthcare access, or from differences in how these factors translate into child nutritional outcomes.

4. Results

4.1 Descriptive Statistics

Descriptive statistics for the study sample of children under five years of age are presented in Table 1, stratified by survey years (2008, 2013 and 2018). The sample sizes were 11,062, 15,438 and 5,516 children for the 2008, 2013 and 2018 respectively and it is for those with valid anthropometric data. The table indicates that the distribution of children by household wealth quintile shows a decline in the proportion from the poorest quintile (from 22.23% in 2008 to 15.82% in 2018) and an increase in the share from the richer (18.15% in 2008 to 22.35% 2018) and the richest (18.47% in 2008 to 21.71% in 2018) quintiles. The table also shows that the percentage of mothers with no formal education fell from 43.76% in 2008 to 32.52% in 2018. However, the percentage of mothers with secondary education rose steadily from 26.03% in 2008 to 39.19% in 2018 and those with higher education increased from 6.07% to 11.02% over the same period. The percentage of mothers engaged in manual/unskilled labour decreased from 58.24% in 2008 to 26.17% in 2018, while the percentage of sales/services occupations rose from 37.68% in 2008 to 64.48% in 2018. Proportion of children whose parents reported being from urban centre rose from 31.44% in 2008 to 47% in 2018. The mean WAZ was -1.02 (SD=1.52) in 2008, -1.20 (SD=1.44) in 2013, and -1.02 (SD=1.25) in 2018. The mean number of antenatal care (ANC) visits increased from 4.69 (SD=5.78) in

2008 to 5.62 (SD=4.63) in 2018. Child sex distribution and mean maternal age remained stable across survey waves under study.

Table 1: Descriptive Statistics

Variables	2008	2013	2018
Categorical variables			
HH Wealth Quintile			
Poorest	22.23%	21.73%	15.82%
Poorer	21.98%	21.53%	18.63%
Middle	19.16%	19.60%	21.50%
Richer	18.15%	18.74%	22.35%
Richest	18.47%	18.40%	21.71%
Mother's Education			
Higher	6.07%	6.43%	11.02%
Secondary	26.03%	27.98%	39.19%
Primary	24.14%	20.11%	17.28%
No Education	43.76%	45.48%	32.52%
Mother's Occupation			
Professional/Skilled	4.09%	4.07%	9.35%
Sales/Services	37.68%	44.57%	64.48%
Manual/Unskilled	58.24%	51.35%	26.17%
Child's Sex			
Female	50.48%	50.49%	48.37%
Male	49.52%	49.51%	51.63%
Residence			
Rural	68.56%	63.19%	53.00%
Urban	31.44%	36.81%	47.00%
Continuous variables	***Mean (SD)***	***Mean (SD)***	***Mean (SD)***
WAZ	-1.02 (1.52)	-1.20 (1.44)	-1.02 (1.25)
Child's age (Years)	1.31 (1.22)	1.33 (1.22)	1.43 (1.25)
Mother's age (Years)	29.54 (7.35)	29.62 (7.24)	30.77 (6.93)
ANC Visits	4.69 (5.78)	5.56 (6.23)	5.62 (4.63)
Sample size	11062	15438	5516

Source: Author's Analysis (2026)

4.2 Concentration Index Estimates

Table 2 shows that the CIs of WAZ indicate the extent and trend of socioeconomic inequality in the child nutritional status of the three waves of the survey. The estimates indicate that when ranking of households by their wealth quintile, the CI was negative, was statistically significant ($p<0.01$) and was substantively large in all years. However, the magnitude of inequality was highest in 2008 (CI = -0.202), improved in 2013 (CI = -0.150), but worsened again in 2018 (CI = -0.171). This trend suggests an ongoing and high level of poorer child nutritional status in poorer household children. The same and more striking trend is witnessed as we do the ranking according to maternal education. The values of the CI were negative and significant at 1 percent significant level as well. It is also larger in value compared to the 2008 and 2018 wealth-based indicator. In particular, the result indicate that it is in 2008 when inequality was the largest as the CI estimate was the lowest (-0.220) followed by 2013 (CI = -0.167) and 2018 (CI = -0.188). This is a pointer that education gap in child nutrition goes hand in hand with maternal education gaps. But when ranked by maternal occupation, there was a reversal concentration. Actually, it gave positive and significant CIs, but of significantly lower magnitude compared to other indices. The CI was 0.062 in 2008, declining to 0.021 in 2013 but rose a bit to 0.024 in 2018. This shows that there is a slight pro-rich inequality, with the better nutritional results slightly concentrated amongst children whose mothers have more skilled jobs. This decrease since 2008 indicates a possibility of a decrease in occupation-based nutritional inequalities with time.

Table 2: Concentration Index Estimates

Variables/years	Wealth quintile	Education	Occupation
2008 CI	-0.2018*** (0.0120)	-0.2195*** (0.0105)	-0.0396*** (0.0017)
2013 CI	-0.1497*** (0.0124)	-0.1669*** (0.0122)	-0.0467*** (0.0190)
2018 CI	-0.1711*** (0.0119)	-0.1881*** (0.0109)	-0.0324*** (0.0025)

*Notes: Standard Error in parenthesis. Statistical significance: ***p<0.01, **p<0.05, *p<0.1*

4.3 Decomposition of Socioeconomic Inequality in WAZ

In order to identify the specific determinants of the observed inequalities, this study decomposed the CI for WAZ using the method of Wagstaff. The results, presented separately for each socioeconomic ranking variable, quantify the percentage contribution of each explanatory factor to the total inequality.

4.3.1 Decomposition Using Wealth as the Ranking Variable

Table 3 presents the decomposition of WAZ inequality when households are ranked by wealth quintile. The explained component (attributable to the observed covariates) accounted for a large majority of the total inequality; 90.25% in 2008, 87.12% in 2013, and 81.05% in 2018. The results showed that maternal education is the dominant and most consistent contributor. Secondary education alone explained 39.68%, 40.83% and 36.96% of the total inequality in 2008, 2013 and 2018, respectively. Tertiary education was the second-largest contributor, with its share rising from 19.70% in 2008 to 32.37% in 2018. This indicates that the unequal distribution of maternal education, skewed towards wealthier households, is a primary driver of pro-poor child nutrition inequality. Access to healthcare, proxied by antenatal care visits, was another significant and persistent factor, contributing 15.83%, 26.19% and 13.14% across the three waves. Urban residence also contributed positively to inequality (12.03% in 2008 and 6.00% in 2018). Other factors, including maternal occupation, child's age and sex and maternal age, made relatively small or negligible contributions to the overall wealth-based WAZ inequality.

Table 3: Decomposition of Socioeconomic Inequality in WAZ Using Wealth as Ranking Variable

	2008			2013			2018		
Variable	**CI**	**Contr.**	**% Contr.**	**CI**	**Contr.**	**% Contr.**	**CI**	**Contr.**	**% Contr.**
Child age	0.0233	0.0051	-2.53	0.01509	0.00166	-1.11	0.02393	0.00095	-0.56
Male child	-0.00626	-0.0006	0.28	0.00953	0.00062	-0.41	0.00963	0.00073	-0.43
Mother's age	0.00959	-0.0021	1.04	0.01132	-0.00261	1.74	0.01462	-0.00317	1.85
Mother – primary	0.05607	-0.0061	3.02	0.06534	-0.0046	3.07	-0.08092	0.00558	-3.26
Mother – secondary	0.43432	-0.0801	39.68	0.42287	-0.06112	40.83	0.26362	-0.06321	36.96
Mother – tertiary	0.70811	-0.0397	19.7	0.69301	-0.03416	22.82	0.59029	-0.05537	32.37
Professional	0.64446	-0.0008	0.41	0.62848	0.00123	-0.82	0.42544	0.00332	-1.94
Mother – sales	0.14095	-0.0016	0.81	0.09183	0.00285	-1.9	0.05785	0.00524	-3.06
Urban residence	0.46661	-0.0243	12.03	0.47225	0.00491	-3.28	0.3424	-0.01026	6.00
ANC visits	0.38969	-0.0320	15.83	0.37139	-0.0392	26.19	0.23021	-0.02248	13.14
Total explained		-0.1821	90.25		-0.13042	87.12		-0.13864	81.05
Residual		-0.0197	9.75		-0.01927	12.88		-0.03241	18.95

Source: Author's Analysis, (2026)

4.3.2 Decomposition Using Maternal Education as the Ranking Variable

Table 4 shows the decomposition when the population is ranked by maternal education. The explained share was 68.24% in 2008, 68.87% in 2013, and 69.57% in 2018. Household wealth was the paramount driver of inequality in this model. Belonging to the richest wealth quintile alone contributed 39.61%, 41.72%, and 49.42% of the total inequality in 2008, 2013, and 2018, respectively. The richer quintile contributed an additional 12-17%. This underscores that economic capacity is the fundamental factor explaining why children of less-educated mothers have poorer nutritional outcomes. ANC visits remained a significant factor, contributing 18.19%, 26.30%, and 15.34% across the waves. Contributions from maternal occupation and place of residence were relatively minor.

Table 4: Decomposition Using Education as the Ranking Variable

	2008			2013			2018		
Variable	**CI**	**Contr.**	**% Contr.**	**CI**	**Contri.**	**% Contri.**	**CI**	**Contr.**	**% Contr.**
Child age	0.0126	0.00278	-1.27	-0.0076	-0.0009	0.54	0.0084	0.00036	-0.19
Male child	0.0017	0.00015	-0.07	0.0125	0.00078	-0.46	0.0076	0.00058	-0.31
Mother's age	0.006	-0.00097	0.44	0.0028	-0.0005	0.3	0.001	-0.00007	0.04
HH poorer	-0.2807	0.01023	-4.66	-0.2585	0.00691	-4.14	-0.3658	0.01713	-9.11
HH middle	-0.0207	0.00148	-0.67	-0.0345	0.00224	-1.34	-0.0756	0.00733	-3.9
HH richer	0.2532	-0.02671	12.17	0.2608	-0.02109	12.63	0.2165	-0.03174	16.88
HH richest	0.6172	-0.08693	39.61	0.6056	-0.06965	41.72	0.5488	-0.09294	49.42
Mother professional	0.767	-0.00615	2.8	0.7944	-0.00365	2.19	0.579	0.0025	-1.33
Mother sales	0.0773	0.00011	-0.05	0.0485	0.00195	-1.17	-0.0074	-0.00116	0.62
Urban	0.2945	-0.00384	1.75	0.3344	0.01284	-7.69	0.282	-0.00397	2.11
ANC visit	0.3684	-0.03992	18.19	0.345	-0.04391	26.3	0.2282	-0.02885	15.34
Total explained		-0.1498	68.24		-0.115	68.87		-0.1308	69.57
Residual		-0.0697	31.76		-0.052	31.13		-0.0572	30.43

4.3.3 Decomposition Using Maternal Occupation as the Ranking Variable

Table 5 contains results from decomposition analysis using maternal occupation type. The decomposition analysis yielded particularly distinct patterns. For, the explained component accounted for a smaller and more variable share of the total inequality compared to when wealth or education were used and the ranking variables. The results turned in -15.73% in 2008, 36.84% in 2013 and 26.08% in 2018. The negative explained share in 2008 is a pointer to the fact that the observed covariates worked in the opposite direction to the overall pro-rich occupation-based inequality. However, the factors contributions varied across years. For instance, maternal tertiary education was a major positive contributor to inequality in all years, meaning it was concentrated among higher occupational groups and associated with better child nutrition. Its contribution was particularly large in 2013 (64.1% of the explained share). Also, household wealth (richest quintile) consistently contributed positively to inequality (11.7% in 2008, 23.1% in 2013, and 34.7% in 2018 of the explained share). Contrastingly, maternal secondary education was a large negative contributor, especially in 2018 (-76.5% of the explained share), which is an indicator that this level of education was more prevalent among lower occupational strata and associated with poorer nutritional outcomes in this model. Primary education also showed substantial negative contributions. The large residual components (115.73% in 2008, 63.16% in 2013, 73.92% in 2018) suggest that unobserved factors related to occupational status such as job security, work environment, play a significant role in driving nutritional inequality when occupation is used as the socioeconomic rank.

Table 5: Decomposition Using Occupation as the Ranking Variable

	2008			2013			2018		
Variable	**CI**	**Contrib.**	**% Contrib.**	**CI**	**Contri.**	**% Contri.**	**CI**	**Contri.**	**% Contrib.**
Child age	-0.0362	-0.00798	-0.128	-0.0352	-0.00402	-0.19	0.0168	0.00064	0.027
Male child	-0.0042	-0.00037	-0.006	-0.006	-0.00039	-0.018	0.0061	0.00047	0.02
Mother's age	-0.0146	0.00315	0.05	-0.0168	0.00339	0.16	-0.002	0.00033	0.014
HH poorer	0.0095	-0.00023	-0.004	0.0689	-0.00085	-0.04	0.0596	-0.0019	-0.079
HH middle	0.083	-0.00365	-0.059	0.018	-0.00062	-0.03	0.0205	-0.00107	-0.045
HH richer	-0.0088	0.00051	0.008	-0.0371	0.00137	0.065	-0.0102	0.00079	0.033
HH richest	-0.105	0.00732	0.117	-0.0891	0.00488	0.231	-0.1034	0.00831	0.347
Mother primary edu.	0.1339	-0.0127	-0.203	0.0626	-0.00381	-0.181	0.1404	-0.00838	-0.35
Mother sec. edu.	0.0915	-0.01432	-0.229	0.0355	-0.00419	-0.198	0.093	-0.01833	-0.765
Mother tertiary edu.	-0.3515	0.01678	0.269	-0.3308	0.01353	0.641	-0.3479	0.0274	1.144
Urban residence	-0.0804	0.0016	0.026	-0.0303	-0.00125	-0.059	-0.0375	-0.00045	-0.019
ANC visits	-0.0017	0.0001	0.002	0.003	-0.00026	-0.012	0.0222	-0.00158	-0.066
Total explained		-0.00982	-15.73		0.00778	36.84		0.00625	26.08
Residual		0.07222	115.73		0.01334	63.16		0.01771	73.92

Source: Author's Analysis, (2026)

4.3.4 Oaxaca-Blinder Decomposition of the Rich-Poor WAZ Gap

To further dissect the gap between economic groups, we employed the Oaxaca-Blinder decomposition, comparing children from "rich" (which is made up of richer and richest quintiles) and "poor" (made up of poorer and poorest quintiles) households (Table 6). Overall, the mean WAZ gap was -0.712 in 2008, -0.778 in 2013 and -0.635 in 2018, all favouring the rich.

The explained component (endowments) accounted for an increasing share of this gap: 47.5% in 2008, 45.0% in 2013, and 60.0% in 2018. Within this, maternal education was the paramount factor. Secondary education explained 24.0%, 28.9%, and 30.8% of the total gap, while tertiary education explained 15.3%, 19.2%, and 23.9% across the respective years. ANC visits also made significant contributions (6.3% to 11.2%). The unexplained component (coefficients), reflecting differences in the returns to characteristics, was small in 2008 (4.6%) and 2013 (3.9%) but rose to 23.8% in 2018. This suggests that by 2018, structural differences in *how* factors like education translate into nutritional outcomes became more important in perpetuating the gap.

Table 6: Oaxaca-Blinder Decomposition of WAZ Differences between Rich and Poor Households

Component	Variable	2008		2013		2018	
		Coeff. (SE)	% of Total	Coeff. (SE)	% of Total	Coeff. (SE)	% of Total
Overall Diff.		-0.712* (0.032)	100	-0.778* (0.025)	100	-0.635* (0.037)	100
Explained		-0.338* (0.047)	47.5	-0.350* (0.042)	45	-0.381* (0.058)	60
	Secondary Educ.	-0.171* (0.058)	24	-0.225* (0.025)	28.9	-0.195* (0.037)	30.8
	Tertiary Educ.	-0.109* (0.015)	15.3	-0.149* (0.013)	19.2	-0.151* (0.023)	23.9
	ANC Visits	-0.045 (0.024)	6.3	-0.087* (0.018)	11.2	-0.053* (0.021)	8.3
	Other Factors	-0.013	1.9	0.111	-14.3	0.018	-2.8
Unexplained		-0.033 (0.107)	4.6	-0.03 (0.111)	3.9	-0.151 (0.098)	23.8
Interaction		-0.341* (0.113)	47.9	-0.397* (0.116)	51.1	-0.103 (0.108)	16.2

*Source: Author's Analysis (2025). Notes: * p<0.05. Other Factors includes primary education, maternal occupation, residence, child's age and sex and maternal age.*

5. Discussion

Applying CI and decomposition techniques to three waves of nationally representative data (2008, 2013, 2018), this study quantified the magnitude of inequality and identified its primary drivers. The results of the findings revealed persistent and significant pro-poor inequality in child nutrition, largely entrenched by the intersecting disadvantages of low household wealth and maternal education, with healthcare access playing a critical mediating role. The study's first key finding is the consistent and negative CI for WAZ when ranked by wealth and maternal education across all survey years. This confirms that undernutrition remains disproportionately concentrated among Nigeria's most socioeconomically disadvantaged children, aligning with extensive evidence from by other researches (Akombi et al., 2017; Huda et al., 2018). The temporal trend; a slight improvement in 2013 followed by a worsening in 2018, is an indicator that macroeconomic fluctuations and policy efforts may have had a transient equalizing effect, but failed to alter the fundamental structural drivers of inequality. This pattern also resonates with the structural inequality hypothesis in health economics, which posits that improvements in average population health can coexist with stagnant or even widening relative inequalities if the underlying social and economic gradients remain unaddressed (Fotso, 2006; Marmot, 2005).

The decomposition analyses the study carried out clearly illustrate the symbiotic relationship between maternal education and household wealth as the twin engines of child health inequality. When inequality is viewed through the lens of wealth, the unequal distribution of maternal education succeeded to be the largest explanatory factor. On the other hand, when viewed through the lens of education, disparities in household wealth account for the lion's share of the inequality. This interdependence is an indicator a vicious cycle: poverty restraints educational opportunities, and lower educational attainment limits economic mobility, thereby jointly compromising the capacity to secure child nutrition (Cutler & Lleras-Muney, 2006). Interestingly, the mechanism through which this happens in composite mode. For instance, higher maternal education improves health literacy, leading to improved infant and young child feeding practices, better hygiene and greater utilization of preventive health services (Adekanmbi et al., 2013). In the same vein, greater household wealth directly increases food security, dietary diversity and the ability to absorb health-related financial shocks. Our finding that maternal secondary and tertiary education were the largest contributors to the explained inequality, especially in the Oaxaca-Blinder decomposition, brings to the fore the intergenerational benefit of investing in women's education, a conclusion strongly supported by other literature (e.g. Victora et al., 2021).

The analysis using occupation as a ranking variable provided another important perspective. The positive (pro-rich) but small CI, alongside a large unexplained residual, shows that maternal occupation in Nigeria captures a different dimension of socioeconomic status than wealth or education. The decomposition revealed that the pro-rich occupational gradient is primarily driven by the concentration of tertiary education and top wealth quintile status within higher-skilled occupational groups. However, the substantial negative contributions from secondary and primary education suggest that within the occupational hierarchy, these education levels are linked to lower-skilled jobs and poorer nutritional outcomes. This reflects the nature of Nigeria's labour market, where formal, high-skilled employment is limited and many with secondary education end up in informal, low-paying service or manual jobs with little security or benefits (ILO, 2020). The large residual component implies that unmeasured occupational factors, like time constraints on childcare, exposure to environmental hazards, or work-related stress are important but uncaptured determinants of child health in this context.

Also, access to and utilization of ANC services is consistently shown to be a significant contributor to inequality in all decomposition models. This agrees with studies demonstrating that ANC is truly an important platform to deliver nutritional advice, micronutrient supplementation and health monitoring to pregnant women. These cumulatively influence birth outcomes and early childhood growth (Bhutta et al., 2008). The pro-rich inequality in ANC utilization highlights how financial and geographic barriers prevent poorer, often rural, less-educated women from accessing these services. Improving the equity of healthcare access is therefore not just a goal in itself but a potential lever for reducing downstream inequalities in child nutrition. The contribution of urban residence to wealth-based inequality is an indicator to the enduring advantage of urban settings, likely due to better access to healthcare facilities, markets with variety of foods and public health infrastructure. Although, the declining contribution of this factor over time, and its instability in other models, may signal the double-edged sword of rapid urbanization. In that, while bringing some advantages, unplanned urban growth can also create sprawling slums where poverty and malnutrition are concentrated, potentially diluting the average urban advantage (Fotso, 2007).

6. Conclusion

This research paper has measured and disaggregated the socioeconomic determinants of child health disparity in Nigeria across a decade of cross-sectional data. The results show the presence and well established pro-poor gradient in child nutritional status in terms of WAZ. It is not a random distribution of ill-health but a direct effect of the synergistic disadvantage that low household wealth and low maternal education have created, and inequitable access to antenatal care is a key reinforcing factor. The unique pattern observed when occupation was used as a ranking variable further indicated that the gains of formal and skilled jobs are not trickling down to a significant portion of the population and children in families that rely on informal and/or unskilled jobs are especially susceptible. The temporal analysis shows that although the level of inequality can vary due to macroeconomic conditions and health policies, the structural underlying determinants are still strong. The increasing role of the unexplained element in later years is an indication that that even when characteristics like education are comparable between rich and poor households, systemic barriers prevent the poor from translating these assets into equivalent health gains. This is an indication of a landscape where mere economic growth or isolated health programmes are insufficient to close the equity gap.

The implication of this is, therefore, that the proper policy should be clearly dual pronged and multisectoral in its approach, mediating both on the immediate determinants of child nutrition and the socioeconomic inequities that generate them. Directly in relation to the empirical findings of this research the following recommendations are offered:

i. Since maternal secondary and tertiary education were the most significant contributors to inequality, government should make sure that girls are educated to at least secondary levels. This involves could involve using specific scholarship or conditional cash transfer towards school attendance.

ii. As household wealth (especially the wealthiest quintile) was the key motivator in models with education as the ranking variable, the poor should be targeted with social protection. Nutrition-sensitive conditional cash transfers tied to antenatal care visits and child growth monitoring, must be established, where available, scaled up.

iii. The regular and prominent role of ANC visits in inequality requires policies that would ensure that these services are accessible to everyone. This involves subsidizing transport expenses and redeploying community health workers to reach remote and underserved populations.

iv. With the role of occupation-type identified in child-health inequality, policies must be geared towards the better conditions and safety of the informal and low-skilled work. This may involve incorporating fundamental health and nutrition training in vocational training courses.

In general, the way forward to equitable child health in Nigeria is to go beyond seeing malnutrition as a biomedical or sectoral problem. It requires an immediate and combined, equity-based approach that acknowledges child nutrition as the ultimate outcome of a household socioeconomic status. Adoption of combined policies that directly address the disparities in wealth, educational and healthcare access, can be used to change the current pro-poor trend in child health in Nigeria into an equitable opportunity trajectory in child health to all children in the country.

References

Adebayo, A. Y., Adedokun, S. T., & Uthman, O. A. (2019). Effects of socioeconomic inequalities on health outcomes in Nigeria: Evidence from demographic and health surveys. *BMC Public Health, 19*(1), 1-10. https://doi.org/10.1186/s12889-019-7306-8

Adekanmbi, V. T., Kayode, G. A., & Uthman, O. A. (2013). Individual and contextual factors associated with childhood stunting in Nigeria: A multilevel analysis. *Maternal & Child Nutrition, 9*(2), 244–259. https://doi.org/10.1111/j.1740-8709.2011.00361.x

Adeyanju, O., Tubeuf, S., & Ensor, T. (2017). Socio-economic inequalities in access to maternal and child healthcare in Nigeria: Changes over time and decomposition analysis. *Health Policy and Planning, 32*(8), 1111–1118. https://doi.org/10.1093/heapol/czx049

Akombi, B. J., Agho, K. E., Hall, J. J., Merom, D., Astell-Burt, T., & Renzaho, A. M. N. (2017). Stunting and severe stunting among children under-5 years in Nigeria: A multilevel analysis. *BMC Pediatrics, 17*(1), 15. https://doi.org/10.1186/s12887-016-0770-z

Anteneh, R. M., Gashu, Z. E., Baffa, L. D., Bitew, D. A., Yenew, C., Demissie, K. A., ... & Asmamaw, D. B. (2025). Decomposing socioeconomic and educational inequalities in infant mortality in Sub-Saharan africa: DHS insights linked to countdown to 2030 and agenda 2063. *BMC Public Health*, *25*(1), 2488.

Bhutta, Z. A., Ahmed, T., Black, R. E., Cousens, S., Dewey, K., Giugliani, E., ... & Shekar, M. (2008). What works? Interventions for maternal and child undernutrition and survival. *The Lancet, 371*(9610), 417–440.

Black, R. E., Victora, C. G., Walker, S. P., Bhutta, Z. A., Christian, P., de Onis, M., ... & Uauy, R. (2013). Maternal and child undernutrition and overweight in low-income and middle-income countries. *The Lancet, 382*(9890), 427-451. https://doi.org/10.1016/S0140-6736(13)60937-X

Blinder, A. S. (1973). Wage discrimination: Reduced form and structural estimates. *Journal of Human Resources, 8*(4), 436–455. https://doi.org/10.2307/144855

Cutler, D. M., & Lleras-Muney, A. (2006). Education and health: Evaluating theories and evidence. *National Bureau of Economic Research*. https://doi.org/10.3386/w12352

Diderichsen, F., Hallqvist, J., & Whitehead, M. (2019). Differential vulnerability and susceptibility: how to make use of recent development in our understanding of mediation and interaction to tackle health inequalities. *International Journal of Epidemiology*, *48*(1), 268-274.

Fotso, J. C. (2006). Child health inequities in developing countries: Differences across urban and rural areas. *International Journal for Equity in Health*, *5*, 9. https://doi.org/10.1186/1475-9276-5-9

Huda, T. M., Hayes, A., El Arifeen, S., & Dibley, M. J. (2018). Social determinants of inequalities in child undernutrition in Bangladesh: A decomposition analysis. *Maternal & child nutrition*, *14*(1), e12440.

International Labour Organization (ILO). (2020). Global employment trends for youth 2020: Technology and the future of jobs. Geneva: International Labour Office.

Khan, J., & Mohanty, S. K. (2024). Poverty induced inequality in nutrition among children born during 2010–2021 in India. *Plos one*, *19*(11), e0313596.

Li, Z., Kim, R., Vollmer, S., & Subramanian, S. V. (2020). Factors associated with child stunting, wasting, and underweight in 35 low-and middle-income countries. *JAMA network open*, *3*(4), e203386-e203386.

Marmot, M. (2005). Social determinants of health inequalities. *Public Health*, *365*.

National Population Commission (NPC) [Nigeria] and ICF (2019). *Nigeria Demographic and Health Survey 2018*. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF.

Nwosu, C. O., & Ataguba, J. E. (2019). Socioeconomic inequalities in maternal health service utilisation: a case of antenatal care in Nigeria using a decomposition approach. *BMC Public Health*, *19*, 1-11.

O'Donnell, O., Van Doorslaer, E., Rannan-Eliya, R. P., Somanathan, A., Adhikari, S. R., Akkazieva, B., ... & Zhao, Y. (2008). Who pays for health care in Asia?. *Journal of Health Economics*, *27*(2), 460-475.

Oaxaca, R. L. (1973). Male-female wage differentials in urban labour markets. *International Economic Review*, *14*(3), 693–709. https://doi.org/10.2307/2525981

Okutse, A. O., & Athiany, H. (2025). Socioeconomic disparities in child malnutrition: trends, determinants, and policy implications from the Kenya demographic and health survey (2014-2022). *BMC Public Health*, *25*(1), 295.

Shewarega, E. S., Tebeje, T. M., Alem, M. B., Assres, M. L., & Fentie, E. A. (2025). Socioeconomic inequality in undernutrition among late female adolescent in sub-Saharan African countries: a decomposition analysis. *BMC Public Health*, *25*(1), 1549.

Smith, L. C., & Haddad, L. (2015). Reducing child undernutrition: Past drivers and priorities for the post-MDG era. *World Development*, *68*, 180-204. https://doi.org/10.1016/j.worlddev.2014.11.014

Solar, O., & Irwin, A. (2010). *A conceptual framework for action on the social determinants of health*. Geneva: World Health Organization.

Victora, C. G., Christian, P., Vidaletti, L. P., Gatica-Domínguez, G., Menon, P., & Black, R. E. (2022). Revisiting maternal and child undernutrition in low-income and middle-income countries: Variable progress towards an unfinished agenda. *The Lancet*, *399*(10331), 1388-1399. https://doi.org/10.1016/S0140-6736(22)00303-0

Wagstaff, A., & van Doorslaer, E. (1991). On the measurement of inequalities in health. Social Sciences and Medicines, 33, 545–557.

Wagstaff, A., & van Doorslaer, E. (2014). Overall versus socioeconomic health inequality: A measurement framework and two empirical illustrations. *Health Economics, 13*(3), 297–301.

World Health Organization (WHO). (2006). *WHO Child Growth Standards: Length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age: Methods and development*. WHO Press.